PI49FCT3805D

3.3V, 2 x 1:5 CMOS Clock Driver

Features

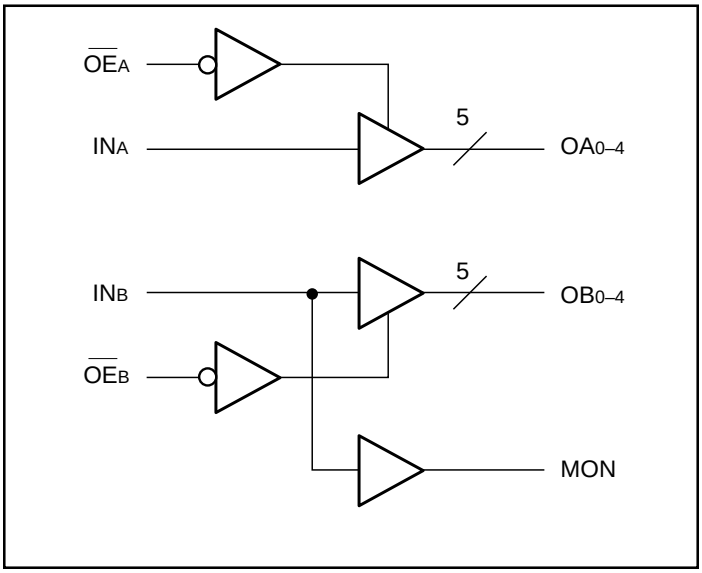
- Low output skew: <270ps
- Switching frequency of 133 MHz
- Fast output rise/fall time: <1.5ns
- Low propagation delay: <3.0ns
- Low input capacitance: <6.0pF
- Balanced CMOS outputs
- Industrial Temperature: –40°C to +85°C
- 3.3V ±10% operation
- Packages available:
  – 20-pin 300-mil wide SOIC (S)
  – 20-pin 150-mil wide QSOP (Q)
  – 20-pin 209-mil wide SSOP (H)

Description

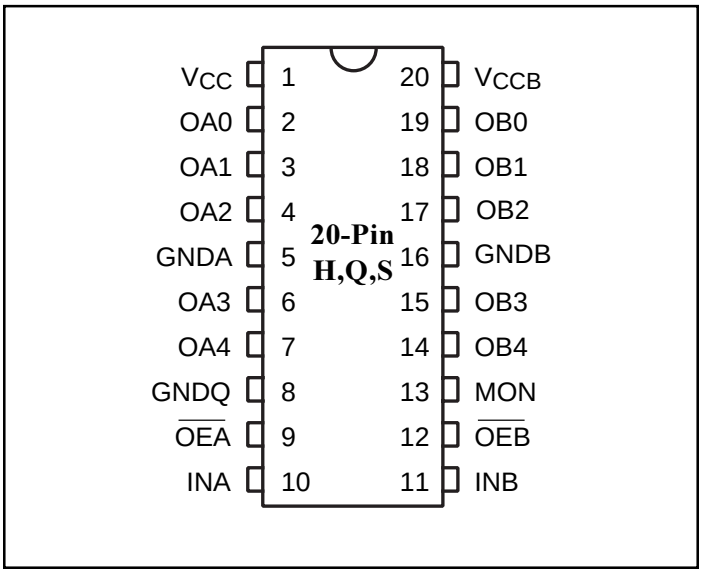
Pericom Semiconductor's PI49FCT series of logic circuits are produced using the Company's advanced submicron CMOS technology to achieve fast speed, low skew, fast slew rate, and low propagation delay for most computing and communication applications.

The PI49FCT3805D is composed of non-inverting drivers. The outputs are configured into 2 groups of one-in, five-out with independent output enable. Group B has an extra MON output. Excellent output signals to power and ground ratio minimize power and ground noise and also improves output performance.

Logic Block Diagram



Pin Configuration



Product Pin Description

Pin Name	Description
$\overline{OE}_A$, $\overline{OE}_B$	Hi-Z State Output Enable Inputs (Active LOW)
IN_A, IN_B	Clock Inputs
OA_N, OB_N	Clock Outputs
MON	Monitor Output
GND	Ground
V_{CC}	Power

Truth Table[1]

Inputs		Outputs	
$\overline{OE}_A$, $\overline{OE}_B$	IN_A, IN_B	OA_N, OB_N	MON
L	L	L	L
L	H	H	H
H	L	Z	L
H	H	Z	H

Note:

1. H = High Voltage Level
   L = Low Voltage Level
   Z = High Impedance

Capacitance (T_A = 25°C, f = 1 MHz)

Parameters	Description	Test Conditions	Typ	Max.	Units
C_{IN}	Input Capacitance	V_{IN} = 0V	3.0	4	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V		6	

Note:
1. This parameter is determined by device characterization but is not production tested.

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature ..... –65°C to +150°C
Ambient Temperature with Power Applied ..... –40°C to +85°C
Supply Voltage to Ground Potential (Inputs & V_{CC} Only) ..... –0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & I/O Only) .. –0.5V to +V_{CC} +0.5V
DC Input Voltage ..... –0.5V to +4.6V
DC Output Current ..... 120 mA
Power Dissipation 0.5W

Note:
Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Operating Range

Ambient Temperature = –40°C to +85°C, V_{CC} = 3.3V ± 0.3V

DC Electrical Characteristics (Over the Operating Range)

Symbol	Description	Test Conditions[1]		Min.	Typ.[2]	Max.	Units
V_{OH}	Output high voltage V_{CC} = Min. V_{IN} = V_{IL} or V_{IH}	I_{OH} = –0.1mA I_{OH} = –8mA I_{OH} = –12mA		V_{CC}-0.2 2.4[3] 2.4[3]	– 3.0 3.0	– – –	V
V_{OL}	Output low voltage V_{CC} = Min. V_{IN} = V_{IL} or V_{IH}	I_{OH} = 0.1mA I_{OH} = 8mA I_{OH} = 12mA		– – –	– 0.2 0.3	0.2 0.4 0.4	
V_{IH}	Input high voltage	LOW logic		2.0	–	5.5	
V_{IL}	Input low voltage	HIGH logic		–0.5	–	0.8	
I_{IH}	Input high current	V_{CC} = Max., V_{IN} = V_{CC}		–	–	1	µA
I_{IL}	Input low current	V_{CC} = Max., V_{IN} = GND		–	–	–1	
I_{OZH} I_{OZL}	High impedance output current	V_{CC} = Max, all outputs disabled	V_{OUT} = V_{CC} V_{OUT} = GND	– –	– –	1 –1	
V_{IK}	Clamp diode voltage	V_{CC} = Min., I_{IN} = –18mA		–	–0.7	–1.2	V
I_{OH}	Output HIGH[4] current	V_{OUT} = 1.5V, V_{IN} = V_{IL} or V_{IH}, V_{CC} = 0V		–45	–74	–180	mA
I_{OL}	Output LOW[4] current	V_{OUT} = 1.5V, V_{IN} = V_{IL} or V_{IH}, V_{CC} = 0V		50	90	200	
I_{OS}	Short circuit[5] current	V_{CC} = Max.		–60	–135	–240	

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 3.3V, +25°C ambient and maximum loading.
3. V_{OH} = V_{CC} – 0.6V at rated current.
4. This parameter is determined by device characterization but is not production tested.
5. Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

Power Supply Characteristics

Parameters	Description	Test Conditions[1]		Min.	Typ[2]	Max.	Units
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max.	V_{IN} = GND or V_{CC}	—	0.1	30	µA
ΔI_{CC}	Supply Current per Inputs @ TTL HIGH	V_{CC} = Max.	V_{IN} = V_{CC} – 0.6V[3]	—	110	300	µA
I_{CCD}	Supply Current per Input per MHz[4]	V_{CC} = Max., Outputs Open $\overline{OE_A}$ or $\overline{OE_B}$ = GND Per Output Toggling 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	0.09	0.16	mA/ MHz
I_C		V_{CC} = Max., Outputs Open f_O = 10 MHz 50% Duty Cycle $\overline{OE_A}$ or $\overline{OE_B}$ = GND Mon. Outputs Toggling	V_{IN} = V_{CC} V_{IN} = GND	—	1.3	9.0[5]	mA
			V_{IN} = V_{CC} – 0.6V V_{IN} = GND	—	1.3	10.0[5]	
		V_{CC} = Max., Outputs Open f_O = 2.5 MHz 50% Duty Cycle $\overline{OE_A}$ or $\overline{OE_B}$ = GND Eleven Outputs Toggling	V_{IN} = V_{CC} V_{IN} = GND	—	4.4	6.0[5]	
			V_{IN} = V_{CC} – 0.6V V_{IN} = GND	—	4.4	7.0[5]	

Notes:
1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.
2. Typical values are at V_{CC} = 3.3V, +25°C ambient.
3. Per TTL driven input (V_{IN} = V_{CC} – 0.6V); all other inputs at V_{CC} or GND.
4. This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
5. Values for these conditions are examples of the I_C formula. These limits are guaranteed but not tested.
6. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_O N_O)$
   I_{CC} = Quiescent Current
   ΔI_{CC} = Power Supply Current for a TTL High Input (V_{IN} = V_{CC} – 0.6V)
   D_H = Duty Cycle for TTL Inputs High
   N_T = Number of TTL Inputs at D_H
   I_{CCD} = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)
   f_O = Output Frequency
   N_O = Number of Outputs at f_O
   All currents are in milliamps and all frequencies are in megahertz.

Switching Characteristics over Operating Range

Symbol	Description	Condition	Max.(2)	Units
t_{PLH} t_{PHL}	Propagation Delay A to Bn	Reference Voltage = 1.5V	3.0	ns
t_R/t_F	Rise/Fall Time 0.4V to 2.4V 2.4V to 0.4V	C_L = 15pF C_L = 15pF	1.5	
$t_{SK(p)}$	Pulse Skew	Reference 1.5V	0.27	
$t_{SK(o)}$	Output Skew	Reference 1.5V	0.27	
$t_{SK(t)}$	Package Skew	Reference 1.5V	0.55	
t_{ZL}, t_{ZH}, t_{LZ}, t_{HZ}	Enable/Disable Time		5.2	
F_{MAX}	Input Frequency		133	MHz

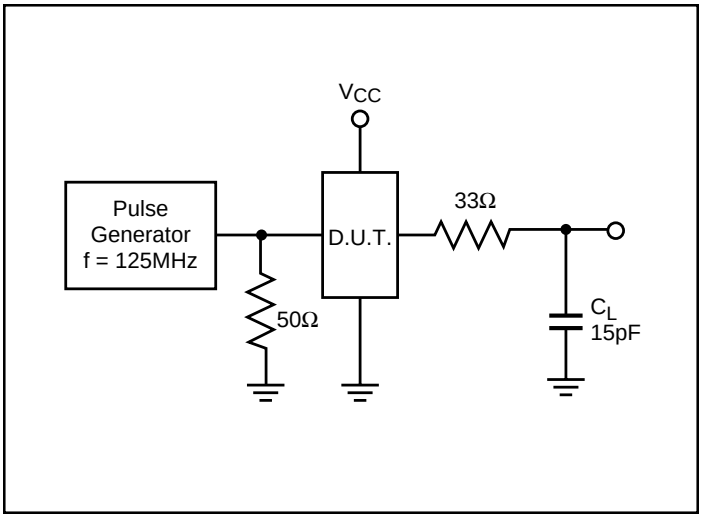
Note:
1. Lumped load, C_L = 15pF
2. These parameters are guaranteed by design
3. Series Resistor loading = 33ohms (See Test Circuit)

Switch Position

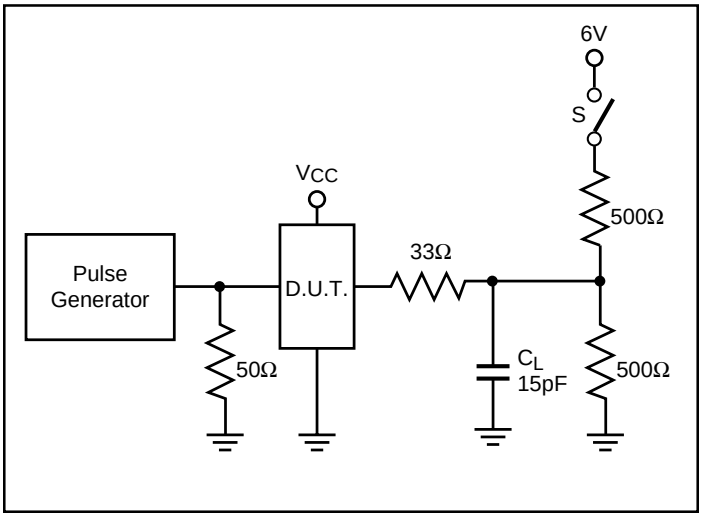
Test	Switch
Disable LOW Enable LOW	6V
Disable HIGH Enable HIGH	GND
All Other Inputs	Open

Definitions:
C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance: should be equal to ZOUT of the Pulse Generator.

Tests Circuit for 133 MHz

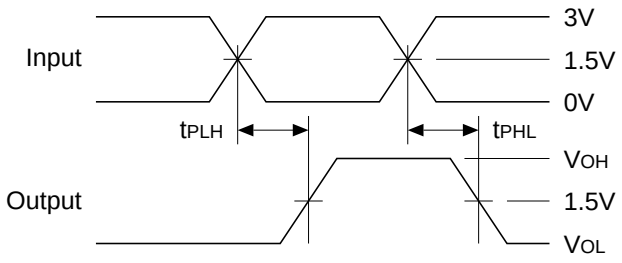


Enable/Disable Time Test Set-Up

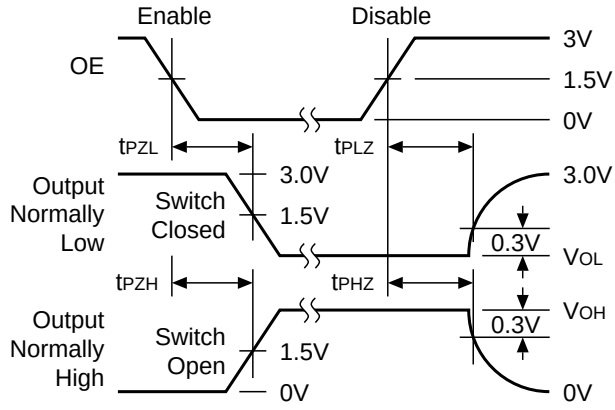


Switching Waveforms

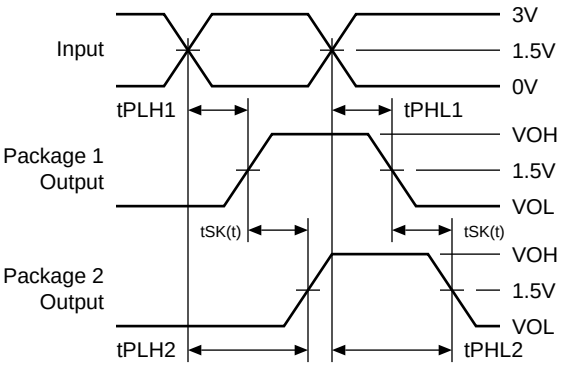
Propagation Delay



Enable and Disable Times

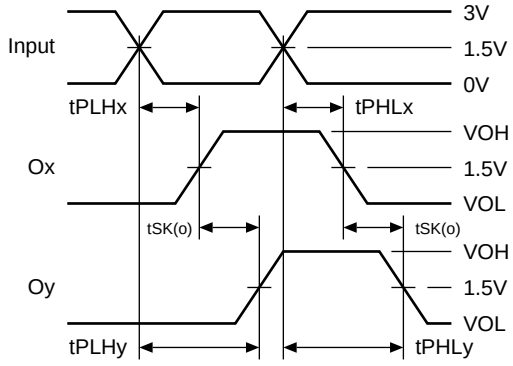


Package Skew – $t_{SK(t)}$



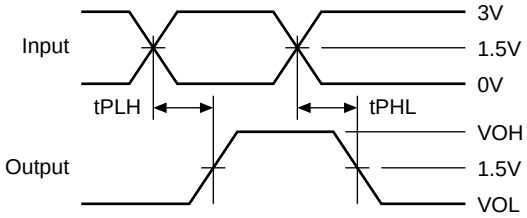
tSK(t) = | tPLH2 – tPLH1 | or | tPHL2 – tPHL1 |

Output Skew – $t_{SK(o)}$



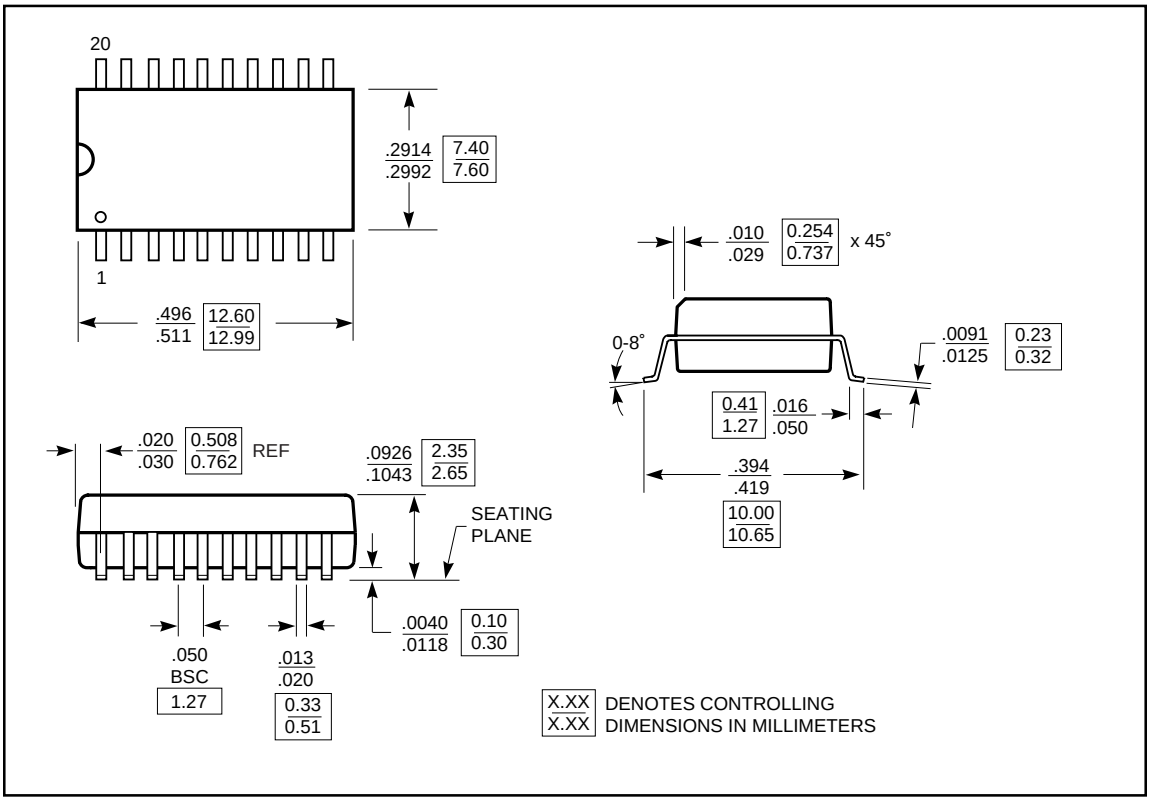
tSK(o) = | tPLHy – tPLHx | or | tPHLy – tPHLx |

Pulse Skew – $t_{SK(p)}$

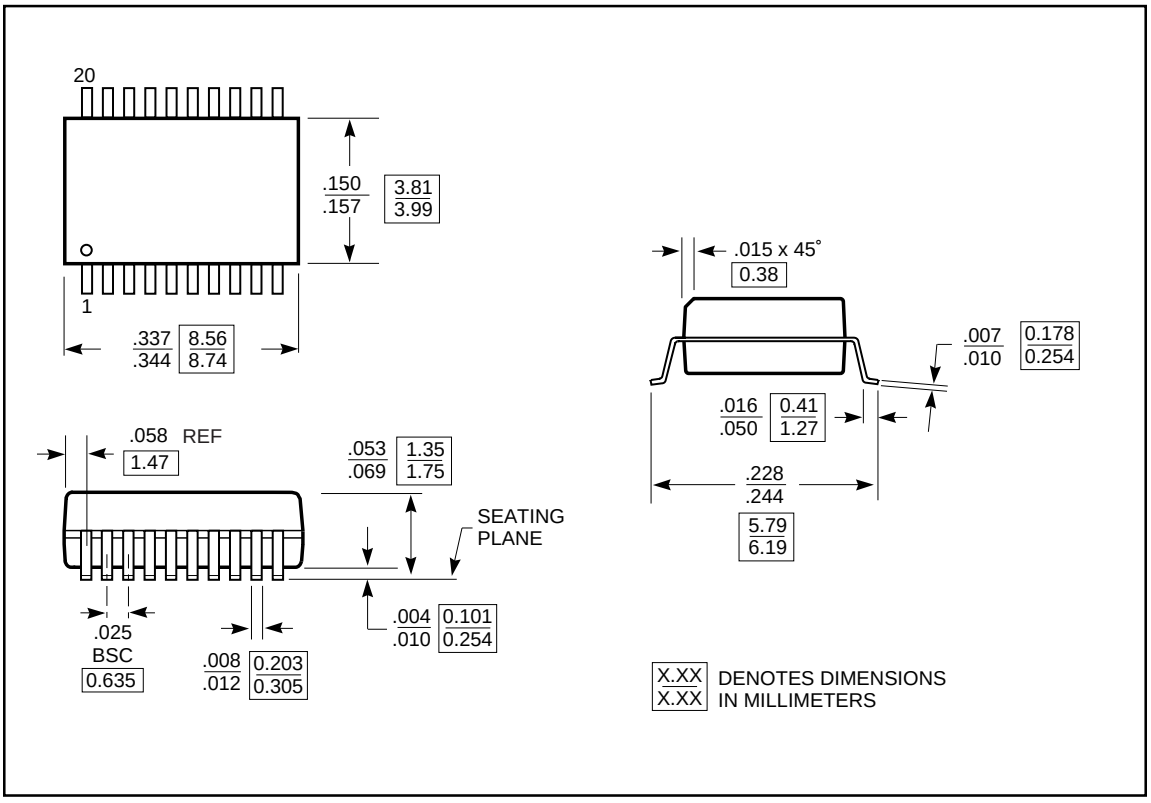


tSK(p) = | tPHL – tPLH |

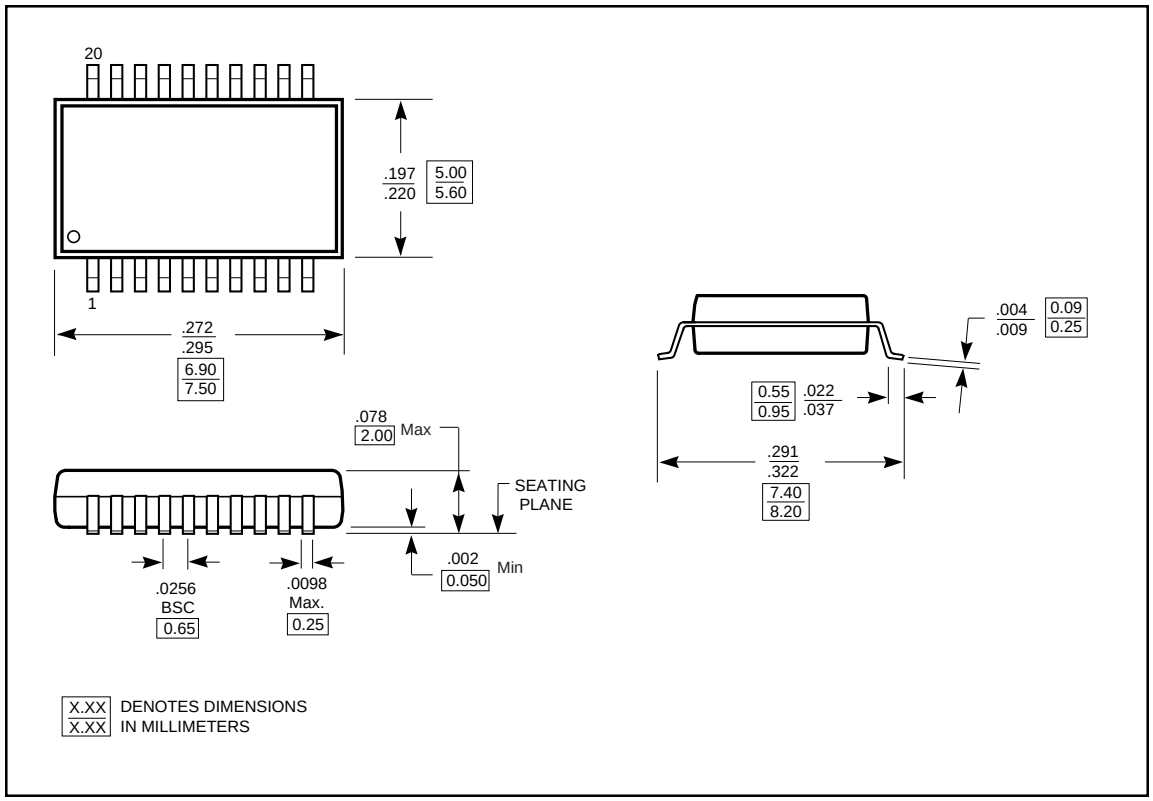
20-Pin 300-mil wide SOIC (S)



20-Pin 150-mil wide QSOP (Q)



20-Pin 209-mil wide SSOP (H)



Ordering Information

Ordering Code	Part Marking	Package Type	Rating
PI49FCT3805DH	PI49FCT3805HD	20-pin 209 mil SSOP	Industrial
PI49FCT3805DQ	PI49FCT3805QD	20-pin 150 mil QSOP	
PI49FCT3805DS	PI49FCT3805SD	20-pin 300 mil SSIC	